Integrated Visualization Environment for Science Mission Modeling, Phase I
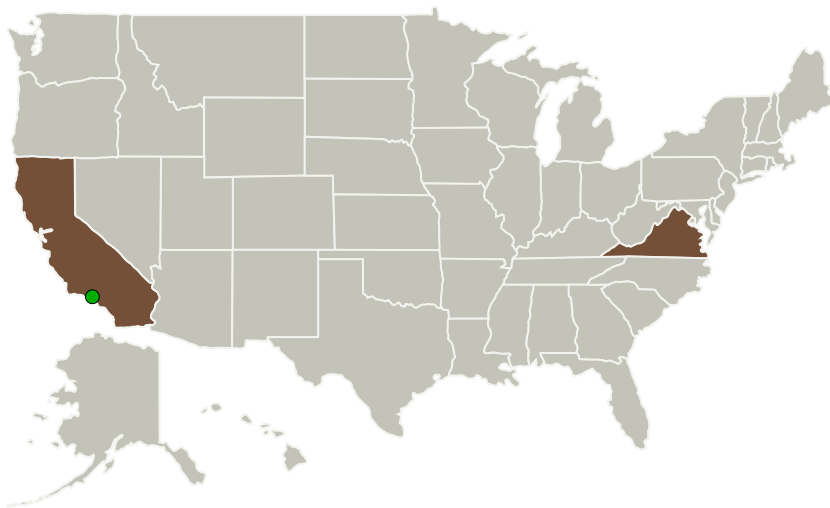
Completed Technology Project (2013 - 2013)

Project Introduction

The proposed work will provide NASA with an integrated visualization environment providing greater insight and a more intuitive representation of large technical data sets. Engineering framework tools now provide a new level of integration with systems engineering, high fidelity computation, mission modeling, and collaborative infrastructures. Innovative visualization technology is required to represent the larger and more complex outputs generated by these frameworks. Our proposed solution will address these issues by developing a visualization environment designed from the start to handle extremely large data sets and providing greater flexibility in terms of the graphical output types that can be produced. This work will involve the use of software technology to parallelize operations, use the GPU, improve memory allocation, and use modern libraries such as OpenGL for efficient rendering. Algorithms to study the "white space" in trade spaces and extend Pareto frontiers into these blank areas will be included. New data mining and clustering algorithms for obtaining insight into complex data sets, involving many parameters, will be built into the visualizer. Features to interact with the underlying computational model (in ModelCenter) and change it easily to observe its effect on the visualized output will be provided. A representative example will be created as a means of demonstrating the new features to NASA and industry. The example will incorporate several new framework technologies (MBSE, mixed fidelity modeling, etc.) and show how the new visualization environment complements these. The new visualizer will be incorporated and commercialized within ModelCenter as a plug-in alongside existing visualization environments.

Primary U.S. Work Locations and Key Partners

Integrated Visualization Environment for Science Mission Modeling

Table of Contents

Organizations Performing Work	Role	Type	Location
Phoenix Integration	Lead Organization	Industry	Blacksburg, Virginia
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Virginia

Project Transitions

▶ **May 2013:** Project Start

✓ **November 2013:** Closed out

Closeout Documentation:
- Final Summary Chart*(https://techport.nasa.gov/file/140464)*
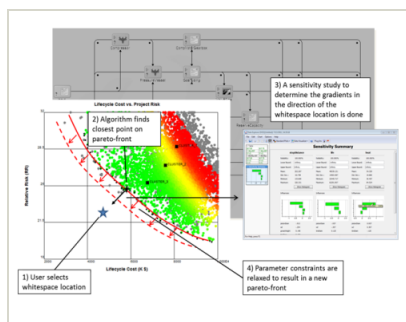
Images

Project Image
Integrated Visualization Environment for Science Mission Modeling
(https://techport.nasa.gov/image/132615)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Phoenix Integration

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Peter Menegay

Co-Investigator:
Peter Menegay

Technology Maturity (TRL)

Start: **3**
Current: **6**
Estimated End: **6**

1	2	3	4	5	6	7	8	9

Applied Research	Development	Demo & Test

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  └ TX11.1 Software Development, Engineering, and Integrity
    └ TX11.1.7 Frameworks, Languages, Tools, and Standards

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System